General Procedure for Locating Events
Second Draft
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Goal: To write down the procedure in detail that I use to locate events for anyone interested in attempting to try it or for anyone who is interested in the procedure. Also this will help standardize the procedure.

The first step of the procedure is to find a 3-D spectromterer track. I do this using myanal. This track will be used to match an emulsion track. To find this track, open myanal and look at the x-view of the event. Look for muons or straight tracks which point to EM Cal or for hits in the VDC that point back to vertex. If there are some hits, try to find scintillating fiber hits on line from the vertex.

Next look in U-view. Look for showers. If 5-20 tracks appear to come from somewhere other than the primary, this is a shower. If there are showers, try to locate origin. Use myanal to do this. Myanal allows you to place the vertex anywhere. Try placing the vertex at the origin of the shower. If the origin is found, all tracks from the showers can be ignored while searching for the primary vertex. Now eliminate all lines that myanal produces. I do this by placing the vertex in a position that is obviously wrong. This will take out all of the lines that myanal produces. This will give a clearer picture of the scintillating fiber hits. This is done because sometimes myanal draws lines through hits that should not be associated. Look for unambiguous lines in this view. Look for isolated pair of hits that appear to go together and make lines out of them. Look for hits that have the same ionization (large ionizations work best for this step) and look like they belong together, and make lines out of these. Make as many lines as possible. Note: At this point it is sometimes helpful to actually print out a copy of the U-view. Then draw the lines in pencil. Sometimes it is easier to see the lines this way. Then make these lines in myanal. Look at all lines and decide which are most reliable, meaning which tracks have the most hits on them and/or have hits that look as if they belong on the line (the line goes through the same point in each of the hits). Choose a vertex location maximizing the number of reliable tracks.

Look in V-view and repeat the above steps. May have to iterate between views to find the best Z-position of the vertex for both views.

Now we have a vertex, and we want to find 3-D spectrometer tracks. I do this by trying to match lines in U and V views to form 3-D tracks. If there is a muon, find U and V lines which form this muon track and use this it. If there is a shower try to pick the core line in each view to form a core track that goes through the EM Cal. Try finding tracks that have hits in the VDC and/or scintillating fiber hits in the X-view. If some of the tracks are ambiguous, use ghost tracks. Save the vertex location and tracks you have selected by selecting write event in myanal. Close myanal and reopen it. This is done in order to write out the correct tracks in the fort.32 file, which writes out all of the tracks that the myanal program produces. I want these tracks to originate from the vertex location I have picked. Choose the most reliable spectrometer tracks and print parameters for each. Make a text file named 0000_00000.vtx, where 0's represent the event and run number, which has the U position, V position, and Z position. Close myanal. Copy fort.33 file to 0000_00000.newtxt. Copy fort.32 file to 0000_00000.txt.

The next step is to run the locate code on this event. The code will take the spectrometer track(s) we found in the last steps and try to match emulsion tracks with them. For each matched track, the code loops over all the other emulsion tracks to look for vertices. Then the code write out a list of these vertices. Open a file called loc.pl. This file is a pearl script. It requires the locations of the files it uses to run the program. Enter the directories where the .newtxt, .vtx, and .all files are located. Enter directory where the daft files and output files should go. Open inputdirs.txt file. Enter the event(s) to run code on. Run code using ./loc.pl inputdirs.txt.

The next step is to look at the output files. First go to directory where output files are. Open 0000_00000.out file. This file gives the position and angle difference between spectrometer track and emulsion track. It also gives the number of tracks in the vertex and the number of these vertex tracks which leave the scan volume. This file gives the average IP for the first segment of each track in vertex. It also gives the average IP of each track in the vertex. Open 0000_00000.pos file. This gives the position of the vertex candidates. It also summarizes how many vertices have how many tracks (1 – over 5, 2 – have 4 tracks, so on). Open 0000_00000.mch file. This file lists all emulsion tracks which matched the original spec track(s).

Go to ROOT analysis directory and open the readdaft.C file. Input the name and location of the daft file for the event of interest. Open ROOT by typing root. Enter .x eventload.C – which loads libraries. Enter .x readdaft.C – which reads in a daft file. Enter .x checkvertices.C – which will look at individual vertices in ROOT. Input which vertex to look at in ROOT. By looking at the 0000_00000.out files, pick some vertices. Look for many tracks and many exiting tracks. Look for low position and angle differences. Look at vertices with low IP values. ROOT will display a vertex. Look at vertex from different angles by clicking on vertex or track and dragging the vertex to any angle. If the tracks have many hits on them, we want to look at the track close to the vertex. Zoom in on the vertex by right clicking on the first or second segment on each of the tracks and the vertex. Then right-click on the background and choose Zoom from pop-up menu. Try to determine whether the vertex is a true vertex or not. Use view details and or view at plate to look for upstream hits on the track – look at least 3-plates upstream. Go through all vertex candidates that are possible.

If one looks good in ROOT, meaning it looks like a vertex through the entire process of looking at it, rotating it, trying to find up and down stream tracks on it, open it in myanal and look to see if emulsion tracks have spectrometer hits on them. If one looks good, send it to Japan. Send this by printing out info on vertex and tracks. If none look good, try running code with looser cuts and repeat. If this does not work, there are different versions of the code to try.